

ready to show to them. It measured 84 x 24 feet. It pleased the board so well that they let me put a concrete floor in the whole building, instead of just the work shop as at first planned. The cost of this building without concrete floor was about \$900.

This new garage has four 10-foot stalls, two 12-foot stalls, and a work room 20 x 24 feet, with a stove for heating. In the work shop we have a bolt rack with a good assortment of bolts, etc.; also angle irons, rods, and other materials for the repair of drags and snow plows; an electric drill; a forge; an anvil and a fair assortment of small tools. We repair our drags, graders, snow plows, etc. We built one snow plow this winter that we think will meet almost any situation to which it can be subjected, but have had no snow to try it out as yet.

Most of our truck repair work is done at a first-class garage in Fowler, as we do not yet keep a mechanic in our own garage, but I believe there could be some plan worked out whereby it would pay the county to keep one.

USE OF SANDSTONE IN HIGHWAY BASE COURSE

By B. F. English, Pike County Highway Superintendent

The construction of improved roads resolves itself into two distinct component parts involving the base or foundation course and the top or wearing surface. The efficiency and durability of each depends to a great extent upon the other. The rigidity of the base must be sufficiently adequate to withstand the weight of the loads that the road is expected to carry. The construction of an adequate base is affected by the firmness of the subgrade, which varies with the moisture in the soil. The ground-water level must be kept at a safe distance below the base by either a raised grade or adequate side-ditch drainage. The top or wearing surface should be kept as nearly impervious as practical, a condition which aids in securing a firmer subgrade.

In all public improvements, a good governmental policy is to get the best results possible for the amount of money expended. With county and township road funds woefully limited, it behooves us to inspect the materials we have locally, to determine their economical usefulness. Any kind of stone in the locality of the proposed road that can be obtained and placed as base material at relatively cheaper cost than other shipped material, should be used.

We have in Pike County approximately 60 miles of sandstone telford base roads. It is specified that the stone shall be one-man size, of certain dimensions, laid by hand transversely with the road, then sledged down and made compact

by filling all voids with spawls from the quarry. Some of our older roads were not rolled and were covered only with coarse sand hauled out of White River. This was very unsatisfactory. Some were covered with 2 to 4 inches of limestone chips passing a $\frac{1}{2}$ -inch screen, and others with 2 inches of clay as a binder and from 3 to 5 inches of washed gravel.

In the early days of the motor age those roads that were built first became very rough because of lack of replacement of wearing surface material, and traffic was thus forced to travel on the large base stones. This condition prejudiced the people against sandstone-base roads. We have had no more trouble or expense keeping a smooth wearing surface on these roads than on roads of a different type base. The principal difference in regard to the maintenance of roads built of sandstone or cobblestones is that such a base cannot be satisfactorily dressed and used as a wearing course. A road base constructed of finer aggregates, if kept properly planed, may be practically worn out before the public is aware of its thinness.

A preferable method for building a sandstone base is to use smaller-size stone that can be dumped between side boards and rolled down to the desired thickness and smoothness. The telford base is not without its merits. During a thaw after a heavy freeze, the telford base will be firmer than one built of small aggregate. The latter will become mushy because of the disintegration caused by frost action.

Sandstone possesses varying qualities. Its condition varies from a hard, tough stone with great crushing resistance all the way down the scale to little more than compact sand. But any sandstone that is firm enough to be blasted from the quarry and wedged and sledged into shape is sufficiently strong for road base material. A good practice is to place the stone base and leave it exposed to the sun and air for a period of ten days for seasoning. Sandstone becomes much more rigid when seasoned, and retains this firmness although it be placed in the moist ground.

A petition from one of our townships for a road $1\frac{1}{2}$ miles long will be presented to the board of commissioners at the next term of court, asking that specifications and estimates be made. Adjacent to this road is good sandstone, easily quarried, which can be placed on this road by either method for \$1.00 to \$1.25 per cubic yard. If crushed limestone or washed gravel is used, either will have to be shipped by rail and will cost \$2.25 to \$2.50 per cubic yard in place. Figuring 1,800 cubic yards for the base, by the use of sandstone we will save \$2,250 on this project.

In view of the above listed facts and principles arrived at, from experience as well as deduction, I will say that when sandstone is cheaper than other materials, by reason of location, it is economy to use it in base construction.